

REMARKS

The present amendment is in response to the Office Action dated July 23, 2003, where the Examiner has rejected claims 1-9, 17, 18 and 50-54, and has objected to claims 10-16 and 55-60. By the present amendment, claims 1, 2 and 50 have been amended. Accordingly, claims 1-18 and 50-60 remain in the present application. Reconsideration and allowance of outstanding claims 1-9, 17, 18 and 50-54 in view of the amendments and the following remarks are respectfully requested.

A. Objection to Claims 50, 55 and 59

The Examiner has objected to claims 50, 55 and 59 as containing informalities. Applicant respectfully submits that the limitations set forth in claims 50, 55 and 59 are supported by the specification of the present application. For example, the present application points out that “a person skilled in the art would recognize that the source 106 may selectively be interchanged with the drain 110 and associated with the photo-detector 102.” Figure 2 and Page 7, lines 1-3 of the present application. As such, well 204 in Figure 2 of the present application may be formed in substrate 202 to contain either source 106 (as shown in Figure 2) or drain 110 (in the above-discussed embodiment where source 106 is interchanged with drain 110). Accordingly, the present application supports the limitation “a well region formed to contain one of the source and the drain” specified by claims 50, 55 and 59.

Similarly, the limitation specified by claim 50 that “an implant formed...to extend between the well region and the other of the source and the drain” is supported by the present application since implant 208 in Figure 2 may be situated between well 204 and either drain 110 (as shown in Figure 2) or source 106 (in the above-discussed embodiment where source 106 is interchanged with drain 110). See also, page 7, line 25 to page 8, line 2 of the present application. For these reasons, applicant respectfully submits that the objection to claims 50, 55 and 59 has been traversed.

B. Rejection of Claims 1-9, 17, 18 and 50-54 Under 35 USC §103

The Examiner has rejected claims 1-9, 17, 18 and 50-54 under 35 USC §103(a) as being unpatentable over Yiannoulos (USPN 5,942,775) (“Yiannoulos ‘775”) in view of Hsieh, et al. (USPN 6,448,595) (“Hsieh ‘595”). Applicant respectfully disagrees; however, in order to expedite the prosecution of the present application, applicant has amended independent claims 1 and 50. For the reasons that follow, applicant respectfully submits that amended independent claims 1 and 50, from which claims 2-9, 17, 18 and 51-54 depend, are patentably distinguishable over the cited references, considered singly or in combination.

The present application discloses and claims a sensor having a transistor with a gate located partially over a source and partially over a drain. By the present amendment, claims 1 and 50 have been amended to further specify that a well region has a “first conductivity type” and that an implant in the material disposed between the well region

and the drain also has “said first conductivity type.” For example, with reference to the exemplary embodiment shown in Figure 2 of the present application, p-type well 204 has the same conductivity type as shallow implant 208, which is implemented using a hole-increasing dopant, i.e., p-type dopant. See, for example, page 6, lines 17-18 and page 7, lines 19-21 of the present application.

Among other benefits, this unique sensor arrangement, as specified by claims 1 and 50, substantially improves the reset process associated with a detection device of the sensor. For example, as explained in conjunction with Figures 5 and 6 of the present application, when the reset voltage applied to the transistor, e.g., FET 104 in Figure 2, is tapered or reduced, “the portion of the channel created by punching the channel substrate portion is pinched off or collapses before the depleted portion of the reset channel (i.e., the channel well portion) causing charges remaining in the reset channel to be swept towards the source and away from the drain or photo-diode 102.” Page 11, lines 19-22 of the present application. As a benefit, thermal noise associated with the reset process is substantially reduced. See, for example, page 11, lines 8-12 of the present application.

In contrast, neither Yiannoulos ‘775 nor Hsieh ‘595 disclose or suggest the sensor specified by claims 1 and 50. With reference to Figure 6 of Yiannoulos ‘775, for example, Yiannoulos ‘775 discloses merged structure 601 which is a merging of photosensing device 101 (of Figure 1 of Yiannoulos ‘775), photosensing device 501 (of Figure 5 of Yiannoulos ‘775), and a MOSFET transistor. As described in Yiannoulos ‘775, the “source feature of the MOSFET is merged on a portion of the deep n-tub ring

feature 636 of the surrounding structure.” Col. 9, lines 19-21 of Yiannoulos ‘775.

Furthermore, the “drain feature of the MOSFET is defined by the portion of the n+ S/D diffusion layer 605’ which overlays a portion of the p-tub feature 634.” Col. 9, lines 32-34 of Yiannoulos ‘775. It is clear, therefore, that deep n-tub ring feature 636 has a conductivity type opposite that of p-tub feature 634, contrary to claims 1 and 50.

Moreover, as explained in Yiannoulos ‘775, the deep n-tub ring feature 636 necessarily has a conductivity type opposite that of the p-tub feature 634, which has the same conductivity type as p-type substrate 102. This is because “photojunction 699 occurs at the interface between n-type and p-type semiconductor regions.” Col. 5, lines 5-6 of Yiannoulos ‘775. For example, in Figure 6 of Yiannoulos ‘775, photojunction 699 occurs at the interface between deep n-tub ring feature 636 and p-type substrate 102. Thus, deep n-tub ring feature 636 must be n-type (and not the same conductivity as p-tub feature 634, which is p-type) since the purpose of deep n-tub ring feature 636 is to “force the photojunction 699 away from a surface of the merged structure 601” for purposes of controlling “the relative response of the merged structure 601 to the red end of the spectrum.” Col. 10, lines 7-8 and 10-11 of Yiannoulos ‘775.

Furthermore, the MOSFET of merged structure 601 in Yiannoulos ‘775 does not operate to reset the photosensing device of merged structure 601, as specified by claim 50. Instead, the MOSFET of merged structure 601 in Yiannoulos ‘775 operates as an access transistor. See, for example, col. 9, lines 64-67 of Yiannoulos ‘775. In sum, Yiannoulos ‘775 is directed to a photosensing device which is a significant departure

from the sensor specified by claims 1 and 50, and neither discloses nor suggests the sensor specified by claims 1 and 50.

Applicant further notes that secondary reference Hsieh '595 fails to cure the basic deficiencies of Yiannoulos '775, as Hsieh '595 is only cited as disclosing that a gate is located partially over source and drain regions. Hsieh '595, however, fails to disclose a well region having a "first conductivity type" and an implant in the material disposed between the well region and the drain also having "said first conductivity type" as specified by claims 1 and 50. As such, the present invention as claimed by independent claims 1 and 50 is patentably distinguishable over Yiannoulos '775 and Hsieh '595, considered singly or in combination. Accordingly, applicant respectfully submits that independent claim 1, and its corresponding dependent claims 2-18 and independent 50, and its corresponding dependent claims 51-54 should now be allowed.

C. Objected Claims 10-16 and 55-60.

On page 7 of the Office action in the Allowable Subject Matter section, the Examiner stated that claims 10-16 would be allowed if rewritten in independent form including all of the limitations of the base claims and any intervening claims. However, as discussed above, applicant respectfully submits that amended independent claim 1 is patentably distinguishable over Yiannoulos '775 and Hsieh '595, and, as such, claims 10-16 depending from independent claim 1, are, a fortiori, also patentably distinguishable over Yiannoulos '775 and Hsieh '595.

The Examiner further stated that claims 55-60 would be allowed if rewritten or amended to overcome the objection to claims 55 and 59. As discussed above, applicant respectfully submits that the objection to claims 55 and 59 has been traversed.


Accordingly, applicant respectfully submits that claims 10-16 and 55-60 should now be allowed.

D. Conclusion

For all the foregoing reasons, a notice of allowance directed to claims 1-18 and 50-60 remaining in the present application is respectfully requested.

Respectfully Submitted,
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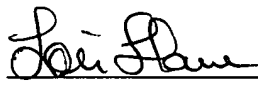
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